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The A.F.A. Conference

The annual convention of the American Foundrymen's Association was this year held in Cleveland in connection with a full-scale exhibition of foundry plant. It had the co-operation of other American countries and was known as the First Western Hemisphere Foundry Congress. The attendance was of the order of 10,000, probably a record. This figure seems very high from European standards, but then the United States cannot be judged on a comparable basis, because the industry for which it caters is so very much larger. According to Mr. H. S. Simpson, the retiring president, the American foundry industry this year will make 15,000,000 tons of castings through the efforts of 750,000 employees. An announcement of international interest was the establishment of a new Branch or Chapter to cover the technical needs of Eastern Canada and Newfoundland. That will give the A.F.A. two branches in Canada. The new president, Mr. Duncan P. Forbes, is a third-generation foundryman and president of the Gunite Foundries Corporation of Rockford, Ill. One goal which he has uppermost in his mind during his turn of office is to increase the membership total to 5,000. It now stands at 4,846, having increased by about 680 during the past year. Credit for this belongs to Mr. Simpson, who must have visited nearly every branch during his year of office, and to Mr. "Bob" Kennedy, the popular secretary. This result must be very encouraging to Mr. C. E. Westover, who quite recently was appointed executive vice-president, or managing director as we should call it. The two American republics which collaborated most closely with the work of the Congress were Brazil and Mexico. The representatives of Brazil gave a very clear picture of the state of affairs existing in the 400 foundries established in their country. Commendable foresight is being shown by the establishment of two institutions, the National Technological Laboratory at Rio de Janeiro and the Institute of Technological Research at Sao Paulo. The latter possesses a model foundry designed especially for improving the general level of foundry technology within their industry. The national industry prefers to use British coke for melting their scrap and very pure charcoal smelted pig-iron. Most Mexican foundries are attached to the railway shops and large industrial plants.

Rear-Admiral George Pettingill (retired), whilst praising the efforts the steelfoundry industry had made in the direction of standardisation, regretted that the non-ferrous section had lagged behind. Much interest was shown in the recruitment and training of apprentices, and deferment has been granted to second-year apprentices in war-production industries. It appears to us that the American ironfoundry industry will be employed on war work to a somewhat higher percentage than that of the United Kingdom, because the manufacture of cast-iron rain-water goods is not so highly developed—probably on account of the climate—as in this country, where it is the speciality of a number of concerns. For sheer novelty, a Paper by Mr. D. V. Ludwig, upon the production hardening of close-grain iron is outstanding, as it was based largely upon the reclamation of highly finished grey-iron castings rejected after they were machined slightly under size, by utilising the growing properties of certain types of materials. Naturally, we shall deal as usual at a later stage with the large number of technical Papers which were presented to the Convention. These, so far as we can gather, were of the same high quality which the foundry world now expects from these gatherings. If we can offer any advice to our Allies over the water, it is, do not, as Europe did, reduce the activities of the technical institutes until actual blitz conditions are in being—a state of affairs we confidently hope will never happen.

Contents

The A.F.A. Conference, 239.—Institute of British Foundrymen, 240.—Free Electrons and Iron Alloy Behaviour, 240.—Cinder and Scale Prices, 240.—The Substitution of High-Duty Grey Iron for Steel Castings, 241.—Low-Tin and Tin-Free Bronzes and Brasses, 247.—The Institute of British Foundrymen (Annual General Meeting, 1942), 252.—Regional Production Controllers, 256.—Personal, 256.—Conference on Mineral Resources, 256.—Must Segregate High-Speed Steel Scrap, 256.—Company News, 258.—News in Brief, 258.—Obituary, 258.—Raw Material Markets, 260.

INSTITUTE OF BRITISH FOUNDRYMEN

At a meeting of the Council of the Institute of British Foundrymen, held in London on June 19, the following were elected to the various grades of membership:—

Members

F. J. Betty, foreman founder, non-ferrous, G. Adlam & Sons; H. Bush, foreman ironfounder, G. Adlam & Sons; C. D. Hope, director and secretary, B. Mason & Burns, Limited; A. D. Myers, technical representative, Foundry Services; G. W. Bush, director, Renshaw Foundry Company; B. Needleman, metallurgist and chemist, Union Steel Corporation, Vereeniging; G. W. Rousham, director, Renshaw Foundry Company; E. J. Williams, partner, Premier Foundry, Barkingside.

Associate Members

P. Dyer, foreman ironmoulder, Benoni Engineering Works, Transvaal; J. P. P. Jones, technical representative, Foundry Services, Limited; H. W. Smith, foundry foreman, Stroud Metal & Plating Company; J. H. Westwood, patternmaker, Coltness Iron Company; S. S. Roy, assistant engineer, India Stores Department, Kulti; V. C. Warren, foundry foreman, Booth & Brookes; E. K. Greenwell, patternmaker, J. Brown & Son, Cleveland Brass Works.

FREE ELECTRONS AND IRON ALLOY BEHAVIOUR

Loose electrons which float around between the atoms of solid iron and its alloys are responsible for many of the properties of these alloys, suggested Dr. R. SMOLUCHOWSKI, General Electric Research Laboratory physicist, in a Paper before the American Physical Society. He presented a new conception of the *rôle* which these "free" electrons play. Applied in practice, it may lead metallurgists to a better understanding of what happens when other elements are added to iron.

In iron, as in all metals which are electrical conductors, there are electrons other than the atomic electrons, floating in this lattice not connected to any particular atoms. The drift of these so-called "free" electrons is responsible for the conduction of electricity as well as of heat. Pure iron at ordinary temperatures has a crystal structure in which the atoms are arranged in the form of interlocking cubes, the corners of each cube forming the centres of adjacent cubes. Thus, they form what is called the "alpha phase" arrangement, and this makes for toughness and strength.

When iron is heated to the temperature of 900 deg. C. it transforms from the normal alpha phase to the gamma phase. Here the atoms are more closely packed than in the alpha phase and the whole metal contracts slightly. If the heating is continued, at 1,400 deg. C., the metal changes back to the alpha phase, which is retained until it melts, at 1,535 deg. C.

When other metals are alloyed with iron, they form a solid solution, comparable to liquid solutions. Some alloying metals increase the range of temperatures over which the gamma phase occurs, while others decrease it or eliminate it entirely. Knowledge of their effects is very important to the metallurgist in planning an alloy for a particular use. If a part in a machine has to withstand a temperature of perhaps 1,000 deg. C., it would not do for the alloy of which it is made to change phase while in operation. One then has to add a metal which prevents formation of the gamma phase. On the other hand, a metal which would have this valuable property might introduce other undesirable properties, as for instance lessened resistance to corrosion. Hence it is necessary to have a selection of alloying agents, from which the proper choice may be made.

It has been found by previous experimenters, said Dr. Smoluchowski, that all the elements to the right of iron in the periodic table (and which can dissolve in it) increase the range of temperature at which the gamma phase occurs. All to the left, with a few exceptions which can be explained, decrease the gamma range, or eliminate it entirely. According to the author, this regularity is explained by changes in the energy of the free electrons in the crystal lattice of an iron alloy with the addition of other atoms. The elements to the right of iron, such as nickel, cobalt and platinum, have more free electrons per atom than iron. Thus they contribute electrons to the iron lattice. In contrast, those on the left, including vanadium, chromium, tungsten and molybdenum, take them away.

Both the number of available electrons and the forces which attract them to atoms are in many cases known from other investigations. On this basis, it is possible to explain even some finer details of the observed phenomena. The more electrons there are per atom, the more stable is the gamma phase, suggested the author, and showed how this follows from the modern quantum-mechanical theory of metals. He stressed also the value of this consideration for practical problems, where it introduces a correlation between a large number of observed but apparently unrelated, facts.

CINDER AND SCALE PRICES

Following are the new prices for cinder and scale for use in blast furnaces and steel furnaces laid down in the Control of Iron and Steel (No. 22) Order, 1942. The principal change is an increase of 6s. per ton for material for open-hearth furnaces:—

Good clean scale for use in open-hearth steel furnaces, f.o.t. producing works, 30s. per ton.

Scale for use in blast furnaces in Shropshire, 25s.

Scale for use in any other blast furnaces or in sintering plants, 23s.

Cinder for use in open-hearth steel furnaces, f.o.t. producing works, 30s.

Ball furnace cinder containing not less than 68 per cent. iron for use in blast furnaces, 28s.

All other cinder for use in blast furnaces, 23s.

THE SUBSTITUTING OF HIGH-DUTY GREY IRON FOR STEEL CASTINGS

Presented at the Annual Conference of the Institute of British Foundrymen on June 20 last

By J. BLAKISTON, A.I.Mech.E.

When asked to prepare this Paper, the writer was faced with the necessity of following a galaxy of Papers on the development of high-duty grey iron* presented during the last decade by the cream of the metallurgical and foundry industries. It is therefore proposed that, in this particular instance, stress is laid on what advantages the engineers have taken of these, what may be called revolutionary developments in the cast-iron industry. The first portion of the Paper will be devoted to concrete examples of high-duty grey iron displacing cast steel. "It will be noted that the term cast iron, in view of the developments which have taken place, is now an obsolete term."

The examples cited are not experiments, but proved cases kindly supplied by engineering firms of repute whose names are household words. This in-

* See list of references at end of Paper.

FIG. 1.—BORING BAR.

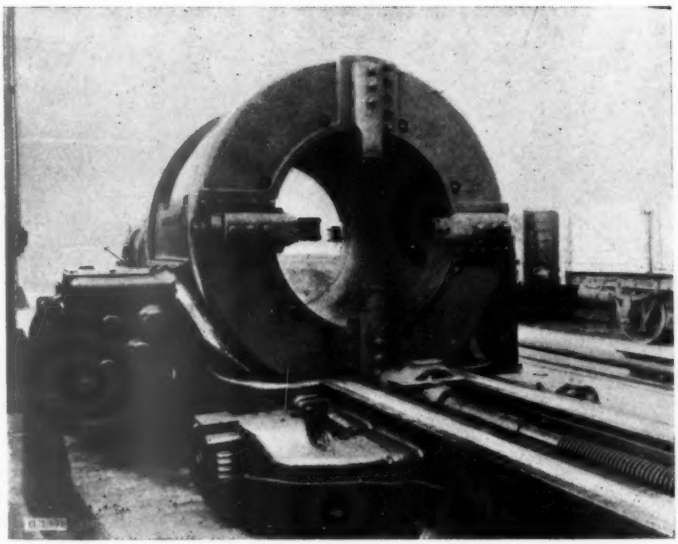


FIG. 2.—BORING LATHE HEAD.

FIG. 3.—FINISHED MEEHANITE SPINDLE.

High-Duty Grey Iron as Substitute

crease in the use of high-duty grey iron has been progressively accelerated by war conditions and presents extending potentialities for post-war developments at the same expansion rate as at present. The second portion of the Paper will describe how the small ironfounder, an engineer, who in many cases has yet been untouched by these developments, can proceed to manufacture some of the grades of this iron. This section has been introduced because sometimes the industry is inclined to forget that the larger percentage of the 2,000 ironfoundries in this country have no technical control of their product, and although probably averaging less than 20 tons output per week individually, collectively produce the major proportion of grey-iron castings consumed in this

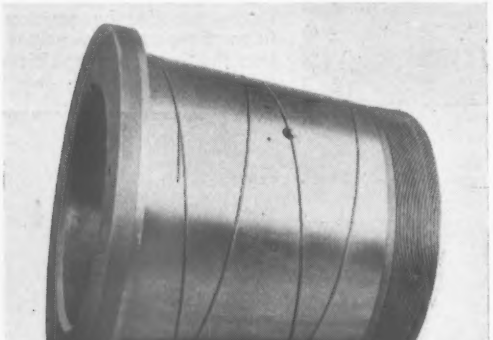


FIG. 4.—SPINDLE NECK.

country. The third and last portion of this Paper will discuss the latest trends and probable future developments in the high-duty grey-iron field.

Cast-Iron Crankshafts

High-speed Diesel and petrol engines are fitted with grey-iron crankshafts[1] as a matter of course. Before Ford fitted his mis-named cast-iron (actually hyper-eutectoid cast-steel) crankshafts to his standard car models, many American manufacturers had been using high-duty grey-iron crankshafts for refrigerators and such like machinery, but kept the matter secret, as they were afraid of public prejudice against cast iron. While the foundry has brought the potentialities of modern irons to the fore, it must be realised that engineering advancement has also extended considerably in several ways, such as increased power and stability of modern machine tools, enabling heavier cuts to be taken on tougher material economically; improvement in cutting-tool properties by the introduction of tungsten carbide, which renders castings

FIG. 5.—HORIZONTAL BORER.

machinable more or less independent of hardness; and improvement in engineering finish and limits, particularly by precision grinding, which reduces breakages caused by misalignments and reduces hammer action by maintenance of correct bearing clearances.

Spindles in High-Duty Irons

Figs. 1 to 4 show typical examples of the use of high-duty cast iron for various types of spindles. The first shows a 45-ft. by 1-ft. 6-in. solid boring bar,[2] replacing a costly steel forging. Fig. 2 shows a large boring lathe head, the hollow spindle being

constructed of 19 to 20 tons tensile iron and weighing approximately 6 tons in the rough state.

Fig. 3 depicts a milling machine spindle. It has been found in practice that, by the use of high-duty grey-iron spindles, it is possible to operate lathes, milling machines, etc., at a much higher speed utilising the remarkable properties of tungsten-carbide cutting tools to their fullest advantage on account of the vibration absorption properties of grey iron.[3]

Fig. 4 shows a horizontal boring machine main spindle neck bearing made from typical grey iron. This revolves in a bronze bush, and the bearing qualities of the combinations are excellent. These bearings are fitted into machines similar to that shown in Fig. 5. It will be seen from the first four illustrations that. apart from its tensile properties, this iron has excellent machinability, taking a fine finish even when extended to fine screw cutting on heavy sections.

The next three illustrations show the use of high-duty iron in one of its pioneer and most popular forms.[3] Fig. 5 shows a horizontal boring machine, the main traverse rack and column rotating rack of which were formerly made in 0.4 per cent. carbon green steel replaced by high-tensile grey iron having a tensile strength of 25 tons. Fig. 6 shows fuel-system flame-hardened machine gears; all high-duty irons lend themselves very readily for nearly all heat-treatment processes.[4] Fig. 7 shows a modern heavy high-duty speed planing machine. The main table rack, which is not shown in the picture, was formerly made in steel, also the tool clapper boxes. Modern grey irons readily meet the arduous services required and take the shock of high-speed reversals without fear of failure.

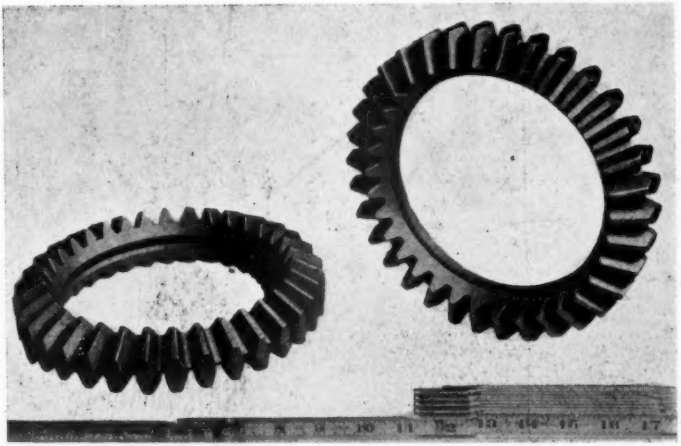


FIG. 6.—GEARS FOR FEED SYSTEM CONTROL GEAR, V NOTCH MACHINED AND FLAME HARDENED.

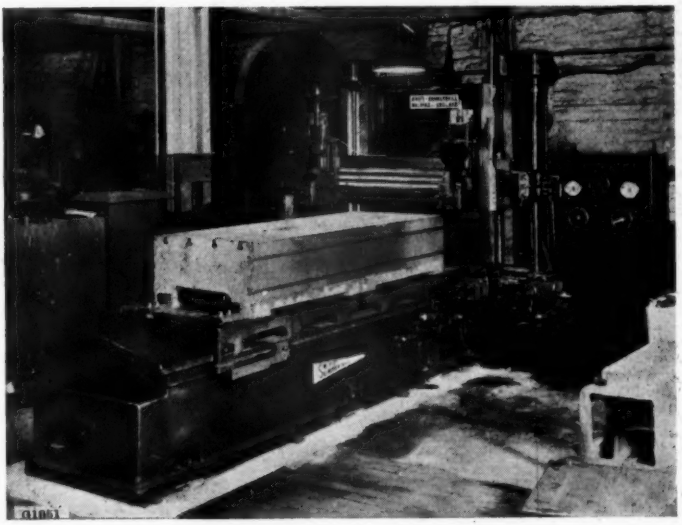


FIG. 7.—PLANING MACHINE.

D

High-Duty Grey Iron as Substitute

In the case of the replacement of steel gearing, the improvements in gear-cutting methods and the advance in engineering technique previously referred to have helped to no mean extent, and the quietness in operation of high-duty grey-iron gears has become an accepted fact. Figs. 8 to 12 give examples of developments which have taken place in the pumping field; Fig. 8 shows a unit for pumping oil at 800 lbs. per sq. in. pressure, originally made from cast steel, but now operating satisfactorily in modern grey iron. Fig. 9 shows a centrifugal boiler feed pump working at 600 lbs. per sq. in. pressure, and the caption by the makers is that the increase in confidence between designers in high-duty irons has been justified by the results obtained.

FIG. 8.—OIL PUMP.

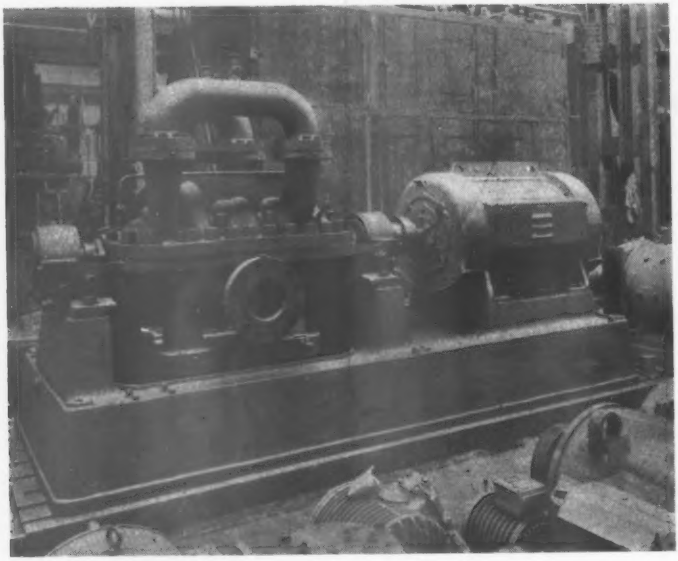


FIG. 9.—FEED PUMP.

Fig. 10 shows an outstanding case where a hydraulic pumping body, formerly cut from billet, has been made from high-duty iron with a tensile strength of 25 tons per sq. in. The connecting rods and cross-head for this pump are another two striking adaptions and are shown in Figs. 11 and 12. Fig. 13 shows a 250-ton extrusion press body, which was formerly made in steel and is now made in high-duty iron with 22 tons per sq. in. tensile. The weight of this casting is 3 tons 12 cwts.; a similar casting made in the early types of cast iron would have indeed been a massive affair.

Earlier illustrations show how modern iron spindles enabled machine tools to obtain the best result from tungsten-carbide cutting tools. This development has logically been taken a step further, and Fig. 14 shows a series of tool shanks. It has been found that it is practicable to make any tool shank of greater section than 1 in. square from high-duty grey iron with beneficial

results, but it is necessary for the tips to be brazed on by external heat. The attachment of the tips by electrical-resistance heating methods up to the present is not satisfactory for this new development in the use of grey iron. The illustrations which have been dealt with up to now are only a few taken at random from an enormous field of successful applications, but the range is eloquent in its descriptiveness.

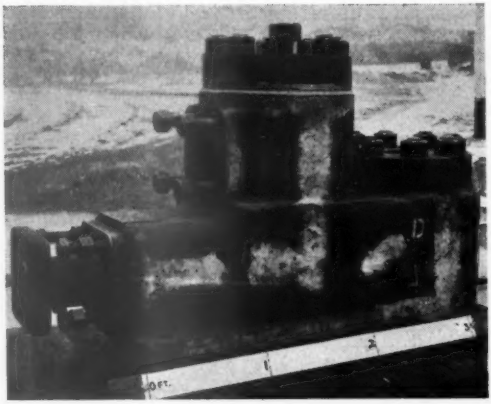


FIG. 10.—HYDRAULIC PUMP BODY. GRADE A MEEHANITE, 24.7 TONS TENSILE; 4,500 LBS. AND 0.302 IN. DEF. ON 1.2-IN. DIA. TRANSVERSE. WEIGHT 22 CWTS. REPLACING BODY CUT FROM STEEL BILLET.

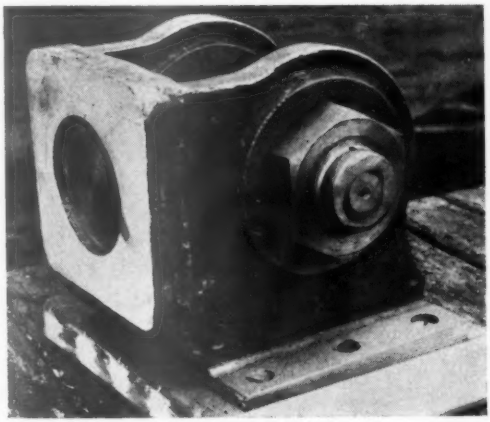


FIG. 12.—PUMP CROSSHEAD. GRADE A MEEHANITE, 25.6 TONS TENSILE; 4,300 LBS. AND 0.258 IN. DEF. ON 1.2-IN. DIA. TRANSVERSE. WEIGHT 1½ CWTS. REPLACING CAST STEEL.

Convincing the Engineer

The small-scale ironfounder when contemplating the manufacture of these newer irons has first of all to convince his customer or his associates in the engineering shops as to the potentialities of his products. With the practical man on the bench and even in the case of certain members of the administration, tensile tests and figures cut no ice, and the following series of tests, which are very simple, have gone a long way to influence certain

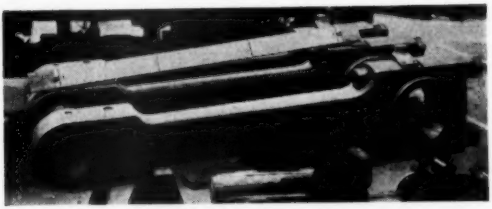


FIG. 11.—PUMP CONNECTING ROD. GRADE C MEEHANITE, 19.1 TONS TENSILE; 4,000 LBS. AND 0.301 IN. DEF. ON 1.2-IN. DIA. TRANSVERSE. WEIGHT 3½ CWTS. THESE CONNECTING RODS HAVE BEEN REDESIGNED TO GIVE THE BEST POSSIBLE SERVICE IN RELATION TO THE FORMER STEEL FORGINGS USED.

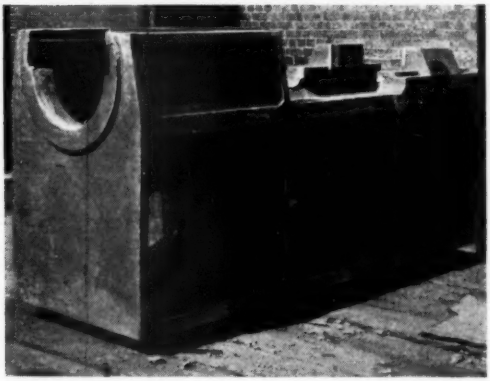


FIG. 13.—250-TON EXTRUSION PRESS BODY. GRADE A MEEHANITE, 22 TONS TENSILE. WEIGHT 72 CWTS.

High-Duty Grey Iron as Substitute

sections of the engineering community as to the possibilities of these new irons. As the small-scale ironfounder cannot be expected to own a complicated testing machine, Fig. 15 shows a simple device by means of which not only can he determine whether a satisfactory iron has been obtained from his furnace, but will impress personnel with his results.

The apparatus consists of a block of cast iron weighing 23 cwts. with two loops cast in 24 in. apart. If a 1-in. dia. cast-iron test bar is placed between these loops, and it has a tensile strength of 23 tons upwards, it should be possible to lift this block from the centre by means of a crane hook. Should a 1-in. mild steel bar be substituted

(*Continued on page* 251.)

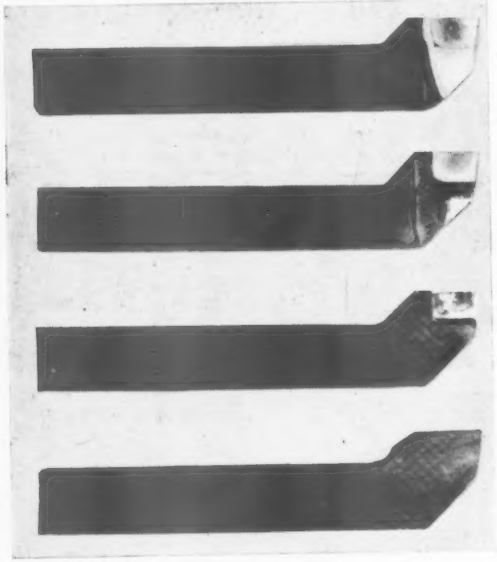


FIG. 14.—TYPICAL MEEHANITE TOOL SHANKS FOR SINTERED CARBIDE TOOLS.

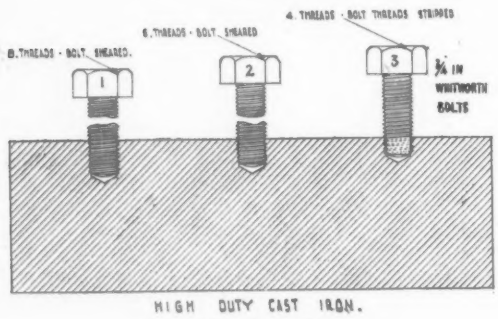


FIG. 16.—SHEAR BOLTS.

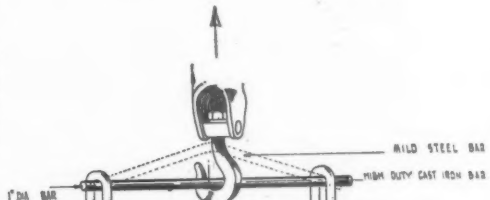


FIG. 15.—TEST WEIGHT.

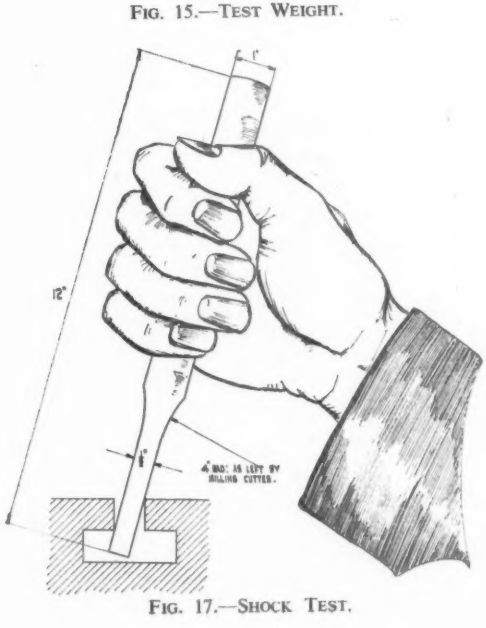


FIG. 17.—SHOCK TEST.

LOW-TIN AND TIN-FREE BRONZES AND BRASSES

By MEMBERS OF THE NON-FERROUS SUB-COMMITTEE OF THE TECHNICAL COMMITTEE

Reports on Practical Tests of Foundry Technique in the use of Types A and B Brasses

(*Continued from page* 230.)

PART III.—THE FOUNDING OF TYPES A and B BRASSES

In the discussions held by the Non-Ferrous Sub-Committee on the War Emergency Specifications for lower tin content gunmetals and cast brasses the general consensus of opinion was that little difficulty would be experienced by the non-ferrous founder in connection with the production of gunmetals to the new specifications. It was, however, felt that some trouble might arise in connection with the production of castings in Cast Brass Types A and B and practical tests were therefore conducted by Mr. E. J. L. Howard and Mr. J. Arnott. The results of these tests and the comments of the two investigators are set out below.

Tests conducted by Mr. E. J. L. Howard

The British Standards Institution has issued War Emergency Specifications Nos. 1025-1028 for cast brasses as shown in the tables on this page.

	Type A.	Type B.
Copper	70 to 80 per cent.	62 to 70 per cent.
Tin	2 per cent. max.	2 per cent. max.
Lead	1 to 4 per cent.	1 to 4 per cent.
Zinc	Remainder ..	Remainder.
Aluminium	0.01 per cent. max.	0.25 per cent. max.
Iron	0.75 per cent. max.	0.75 per cent. max.
Nickel	1.0 per cent. max.	1.0 per cent. max.
Manganese	—	0.25 per cent. max.
Metals other than those specified ..	0.5 per cent. max.	0.5 per cent. max.

Experience has shown that the methods of running castings made of these alloys need not differ from those adopted for bronzes unless the copper content of the Type B is on the low limit and the aluminium on the high limit, when the characteristics of the alloys resemble those of manganese bronze. In such cases, moulding methods similar to those adopted for manganese bronze are necessary because of the high shrinkage of the alloy. Care should, however, be taken to avoid running into this difficulty. The metal runs well and gives a good casting surface. The type of sand and mould dressings used for bronzes is quite suitable for the production of sand castings and it has not been found necessary to adopt excessive venting.

It is advisable to pour both types of alloys at a lower temperature than that adopted for bronze. High casting temperatures appear to cause scabbing and poor casting surface.

Some results obtained with test-bars melted under normal foundry conditions from scrap metal are tabulated. These bars were cast in green sand moulds at a temperature of about 1,000 deg. C. It will be seen that all the bars readily meet the proposed specification for both physical properties and chemical analyses. No foundry should experience any difficulty in obtaining similar results.

The addition of lead to these alloys makes them particularly easy to machine and enables sleeves and bushes made from them to run together without seizure occurring. Tests have been made to ascertain the effect of running sleeves and bushes of these alloys with water lubrication under a heavy load. For the purpose of the test a sleeve was mounted on a shaft and rotated at 1,500 r.p.m., a stationary loaded bush being located around the sleeve with a diametral clearance of 12 mils between the two. The weight of the bush and its mountings was 91 lbs. and an additional

	Separately cast test bar.	Cast-on test bar.	Separately cast test bar.	Cast-on test bar.
Ultimate tensile stress tons per sq. in. ..	11	11	14	14
Elongation per cent. on 2 ins.	20	15	12	10

Low-Tin and Tin-Free Bronzes and Brasses

load of 400 lbs. was added, making a total of 491 lbs. Undue wear was indicated by the power to drive fluctuating from relatively low values to high values, measured with an ammeter. In all cases, the brasses ran quite well, and gave no indication of seizing. They also ran well with bronzes which are lead-free. Most bronzes, providing one or both contain 2 per cent. or more lead, will run without seizing under similar conditions of test. Bronzes which do not contain lead seize, as is the case with the brasses.

TABLE I.—*Results obtained from Scrap Metal Charges*

Cast No.	Cu Per cent.	Sn Per cent.	Pb Per cent.	Zn Per cent.	Fe Per cent.	Ni Per cent.	Al Per cent.
A.1	73.41	0.05	2.50	23.83	0.11	0.10	Nil
A.2	70.69	0.12	3.39	25.42	0.08	Nil	Nil
A.3	74.20	0.55	2.80	23.02	0.09	0.14	Nil
A.4	72.90	0.31	2.90	23.56	0.27	0.06	Nil
B.1	66.21	0.24	3.07	30.35	0.08	Nil	0.05
B.2	63.41	0.61	2.89	32.80	0.18	0.11	Nil
B.3	64.71	0.36	2.12	32.40	0.26	0.10	0.05
B.4	64.11	0.87	2.95	31.96	0.11	Nil	Nil

Physical Tests

Cast No.	Ultimate stress. Tons per sq. in.	Elongation per cent. on 2 ins.	Brinell hardness.
A.1	15.9	32	47
A.2	15.1	30	49
A.3	14.2	21	56
A.4	13.8	24	53
B.1	14.3	41	50
B.2	16.0	27	57
B.3	15.1	32	53
B.4	14.3	16	62

The addition of tin to the alloys appears to aid the casting properties. The metals appear to run more readily than without tin and have a better finish. Tin adversely affects the ductility of the metal measured by elongation but improves slightly the resistance to corrosion.

Both grades of brass have been used for small valves weighing about 2 lbs., caps to withstand 100 lbs. pressure, brackets, flanges, logging rings, sleeves and bushes, with complete success, and no difficulty has been experienced in the founding of these castings. The methods of moulding were the same as adopted for bronzes.

Tests Conducted by Mr. J. Arnott

A test was made to determine if any difficulties would be encountered in making a medium sized casting in Type B brass using moulding and gating methods commonly adopted for gunmetal.

The example chosen was an air pump cover which weighed 2¼ cwts. in the rough. This casting is roughly 30 in. in diameter, and is illustrated in Fig. 1. It was made in dry sand, run from the rim with one main riser on the centre flange boss and two dummy risers on the elliptical flanges as shown in the sketch outlined in Fig. 2. These feeding arrangements were not very generous, but they give satisfactory castings in gunmetal.

The metal used was scrap naval brass rod ends, etc., from the machine shops, and the only addition in melting was a quantity of zinc sufficient to balance that lost during melting. The test was made before the issue of the specification for Emergency British Standard Cast Brass Type B, and the metal employed does not quite meet the requirements with regard to lead content.

The analysis of the casting was as follows:—

Cu	60.46	per cent.
Sn	1.20	,,
Pb	0.54	,,
Zn	37.53	,,
Fe	0.17	,,
Ni	Trace	
Mn	Nil	
Al	0.04	per cent.

The aluminium was estimated by the mercury cathode method, and the figure given may be considered accurate to less than ± 0.01 per cent.

Low-Tin and Tin-Free Bronzes and Brasses

(An outline of the method of conducting this test is given as an appendix to these notes.)

The rough casting looked quite satisfactory; there were no signs of shrinkage defects or sinks. When it was machined, however, a number of small shrinkage tears were found in the bore and on the outer flange. These are shown on Fig. 3, taken at twice natural size. It is doubtful if these defects are serious since they are of little depth, but they would be considered objectionable in a high-quality casting. Doubtlessly modified gating and feeding methods would eliminate these imperfections, but it is interesting to note that, in a casting of this

FIG. 1.—AIR-PUMP COVER, TYPE B BRASS.

size, the differences in characteristics between gunmetal and Type B brass are distinctly noticeable.

A sound section taken from the rim of the casting was examined by the Mond Nickel Company, Limited, for mechanical properties and structure. A tensile test-piece 0.505 in. in diameter with 2 in. gauge length was prepared, and gave the following results:—

Limit of proportionality, tons per sq. in.	4.5
0.1 per cent. proof stress, tons per sq. in.	7.0
Yield point (0.5 per cent. elong. under load), tons per sq. in.	8.8
Ultimate stress, tons per sq. in.	15.0
Elongation per cent. on 2 ins.	9.0
Brinell hardness (10/1,000/15)	90.0

Figs. 4 and 5 illustrate the structure of the section at 50 and 500 magnifications after etching with ammoniacal ammonium persulphate. Fig. 5 is of particular interest, as it shows the distribution of what is apparently the delta constituent arising through the presence of tin. This constituent promotes brittleness, and it is interesting to note that in this case a tin content of 1.2 per cent. has reduced ductility as indicated by elongation to 9.0

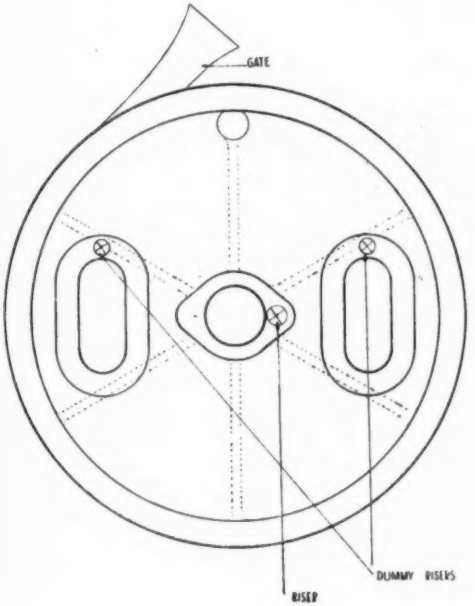


FIG. 2.—SECTION METHOD OF GATING AND FEEDING AIR-PUMP COVER.

per cent. It might, therefore, be assumed that when the copper content in Type B brass is on the low side of the compositional range a tin content of 1.0 per cent. should not be exceeded, otherwise some difficulty may be experienced in meeting specification requirements so far as elongation is concerned.

Low-Tin and Tin-Free Brasses and Bronzes

APPENDIX

MERCURY CATHODE METHOD FOR THE DETERMINATION OF ALUMINIUM IN BRASS OR BRONZE, BY J. McPHEAT (ASSOCIATE MEMBER).

Weight of Sample.—

5 grms. sample for aluminium less than 0.1 per cent.

2 grms. sample for aluminium from 0.1 to 0.5 per cent.

1 grm. sample for aluminium from 0.5 to 2.0 per cent.

Method.—Dissolve in 25 ml. dilute nitric acid (1 : 1), boil and separate tin if present in the usual manner. Add 10 ml. sulphuric acid (conc.) and take down to fumes of SO_3. Fume strongly for 3 min., cool, add 100 ml. distilled water and boil to dissolve salts. Cool,

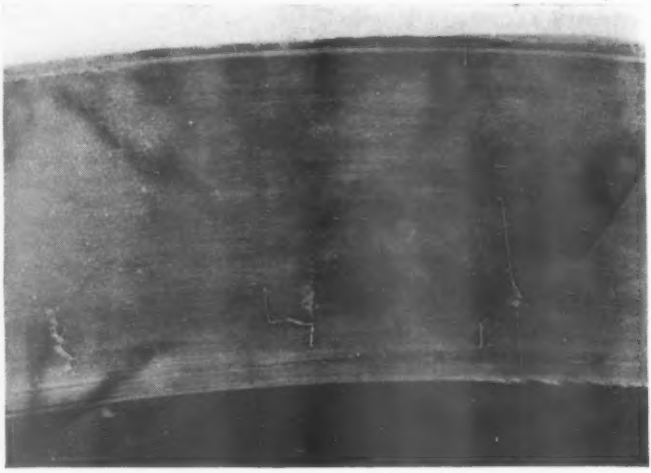


FIG. 3.—OUTER FLANGE OF AIR-PUMP COVER, SLIGHTLY MAGNIFIED, SHOWING SMALL SHRINKAGE TEARS.

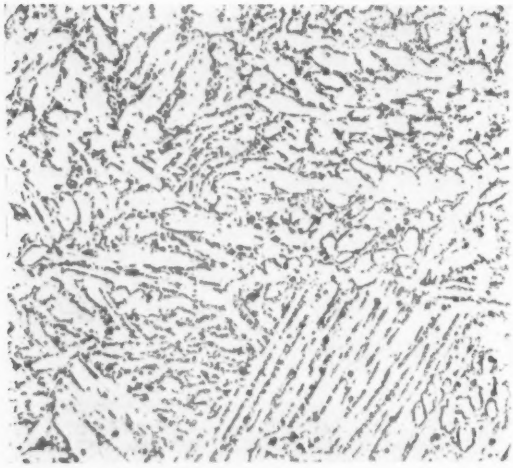


FIG. 4.—TYPE B BRASS: STRUCTURE OF AS-CAST SECTION, × 50, ETCHED WITH AMMONIACAL AMMONIUM PERSULPHATE.

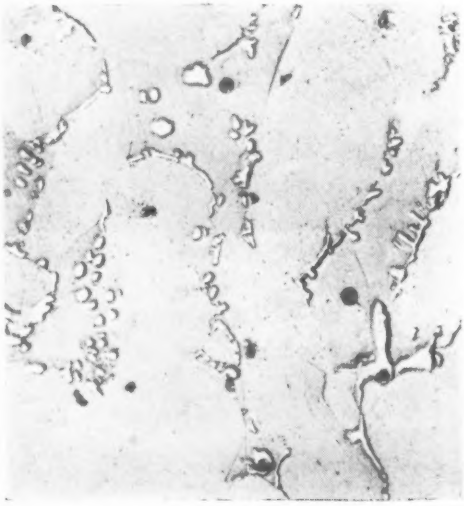


FIG. 5.—TYPE B BRASS: STRUCTURE OF AS-CAST SECTION, × 500, ETCHED WITH AMMONIACAL AMMONIUM PERSULPHATE.

Low-Tin and Tin-Free Bronzes and Brasses

and wash into an electrolysis beaker (Fig. 6 containing 20 mil. mercury and electrolyse overnight (16 hrs.) at 1 amp.

When electrolysis is complete, quickly transfer the clear electrolyte to a 600 ml. beaker and wash the mercury and beaker by decantation (10 washes), add 5 grms. ammonium chloride and a few drops of sulphurous acid and boil for 1 min. Cool, add ammonium hydrate till just alkaline to methyl red, boil for 2 mins., settle, filter and wash with 2 per cent. ammonium chloride solution, and finally with hot water.

Ignite and weigh as Al_2O_3, calculate to Al.

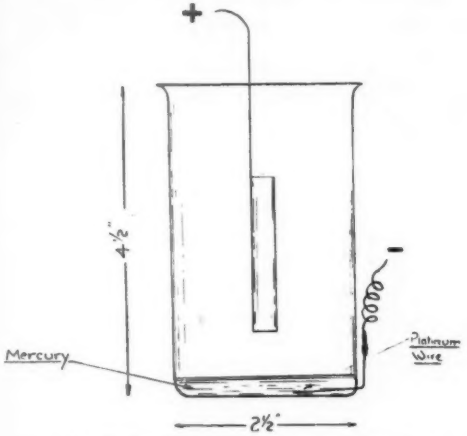


FIG. 6.—ELECTROLYSIS BEAKER FOR THE ESTIMATION OF ALUMINIUM IN BRASS BY THE MERCURY CATHODE METHOD.

Alternative precipitation, for very low percentages and referee work.

After the first precipitation of aluminium, filter and wash as above, dissolve the precipitate in hot hydrochloric acid (1:1), dilute to 100 ml. with water, make just ammoniacal, then acid (3 drops excess acid) with hydrochloric (1:1). Add 3 ml. saturated ammonium bisulphite to reduce any slight trace of iron. Add 3 drops methyl orange, quickly bring to neutrality with ammonium hydrate, then add 3 ml. of (1:1) hydrochloric acid in excess. Add 5 ml. phenyl-hydrazine and stir until the precipitate becomes flaky. The supernatant liquid should be plainly acid to litmus. Settle 15 mins. Filter and wash with phenyl-hydrazine wash solution. Ignite first at a low temperature (600 deg. C.), then at a high temperature (900 deg. C.), and weigh as Al_2O_3.

Notes.—Phenyl-hydrazine solution for washing: Add saturated SO_2 water to a few ml. of phenyl-hydrazine until the crystalline sulphite first formed is redissolved, then add phenyl-hydrazine drop by drop, with vigorous agitation till free from SO_2. Dilute this solution 10 ml. to 100 ml. of hot water for use. For accurate work the Al_2O_3 residue may be treated with HF and H_2SO_4 for the removal of possible SiO_2. In an alloy containing phosphorus, it is advisable to precipitate the aluminium as phosphate.

THE SUBSTITUTING OF HIGH-DUTY GREY IRON FOR STEEL CASTINGS

(*Continued from page* 246.)

for the cast iron bar it will be found that the block cannot be lifted, as the yield point of the mild steel is considerably below that of the weight of the block.

Test 2 is set up as in Fig. 16. A block of high-duty iron has three blind holes drilled and tapped ¾ Whitworth thread, the first hole being eight threads deep, the second hole being six threads deep, and the third hole being four threads deep. Even when using high-tensile steel tap bolts, it will be found that when the bolts are screwed hard against the bottom of the hole and full leverage is exerted by means of a long spanner, the bolts will shear off in the case of No. 1 and No. 2 bolts before the thread strips, and that in the third case it will be the steel bolt whose threads shear, and not the thread in the cast-iron block. This experiment shows the possibilities for the use of this iron for tool blocks and boxes where clamping bolts are constantly being used.

The third experiment (Fig. 17) shows how a good quality high-duty iron can have considerable shock resistance, and so can readily be used for operational levers in place of those formerly made in steel and malleable iron. If the test-piece as shown is made from an iron having 25 tons per sq. in. tensile strength with a very low phosphorus content, no matter how hard the bar is "jagged" with one or two hands, it will be impossible to break it.

(*To be continued.*)

Centrifugal Casting of Liners.—Ford is reported by "Metals and Alloys" to be casting successfully, by the centrifugal process, aeroplane cylinder liners, a process highly developed in this country.

THE INSTITUTE OF BRITISH FOUNDRYMEN

ANNUAL GENERAL MEETING, 1942

Presentation of Oliver Stubbs and E. J. Fox Gold Medals and Meritorious Services Medal

(*Continued from page* 220.)

Presentation of the Oliver Stubbs Gold Medal

The PRESIDENT, formally presenting the Oliver Stubbs Gold Medal for 1942 to Mr. S. H. Russell, said the Council's recommendation of the award was unanimous. Outlining the high spots of Mr. Russell's service to the Institute, he said he had joined as an associate member in 1906 (two years after the formation of the Institute), and was elected a member in 1920. He had served as President of the East Midlands Branch, and was elected President of the Institute at the Leicester Conference in 1928. In 1937 he was elected honorary treasurer of the Institute and he had also served as chairman of the Organisation Committee which was responsible for the drafting of the proposed new rules.

One of the activities in which Mr. Russell had been keenly interested was that of foundry technical education. When examinations in foundry practice and science and in pattern-making were commenced by the Institute (through the City and Guilds of London Institute), Mr. Russell was elected Vice-Chairman of the Advisory Committee; later he was elected to the chair of that Committee, and had occupied it with distinction ever since. In addition to his normal duties as chairman, he had personally undertaken the general supervision of the examination standards. Mr. Russell had also been a prolific contributor to the discussions of Papers at Branch meetings.

The medal was formally presented to Mr. Russell, and the members expressed their confirmation of the award by their applause.

MR. RUSSELL, responding, said the award was a great honour which, he confessed, had come to him somewhat unexpectedly. On occasions he had found himself in a somewhat embarrasing position at Council meetings when he had heard his name mentioned during the consideration of such awards; but, quite candidly, he had never expected the award of the Oliver Stubbs Medal.

Work of Education Committee

One factor which pleased him particularly, however, was that the award should have been made to him mainly on account of the help he had been able to give the Institute on the educational side of its work. The work of the Education Committee had mainly devolved into speeding what was known as the Advisory Committee to the City and Guilds of London Institute. Many years ago the foundry and patternmaking examinations, with the City and Guilds as the examining body, were not particularly popular; perhaps they were not very well organised from the practical point of view. At any rate, several representatives of the I.B.F. were nominated to interview representatives of the City and Guilds, who were extremely helpful. As a result, the examination papers were revised, and a Moderating Committee was set up, under the chairmanship of Mr. C. W. Biggs; when Mr. Biggs had resigned, he (Mr. Russell) was asked to take the chair. At that time the duties were pleasureable, interesting and instructive, because, in addition to having the help of the members of the Institute on the Advisory Committee, there was also the help of representatives of the teaching profession and of allied bodies. Unfortunately, since the beginning of the war, the City and Guilds had adopted the policy of not calling any of the Advisory Committee meetings, and the responsibility, to his regret, had been thrown entirely upon himself as chairman. Thus, for any Papers which members of the Institute might not like, he as the examiner must be responsible, inasmuch as he had "vetted" them. An effort was being made to get the Advisory Committee functioning again; failing that, the Education Committee would examine the Papers for the last three years and see that the standard was really satisfactory.

Mr. Russell emphasised, in connection with the educational work with the City and Guilds, that an enormous amount of credit was due to Mr. Makemson (the Institute's General Secretary), for he was the original examiner for the City and Guilds, and had done a tremendous amount of spade work in the preparation of the syllabus. Also, he and the Committee had drawn up another syllabus, which had been in a pigeon hole for several years, for a more advanced form of examination for foundry students. Just as the City and Guilds had an intermediate and a final examination for patternmakers, so it was hoped to have an intermediate and a final for foundrymen.

Annual General Meeting of Institute

That was due very largely to the work of Mr. Makemson, and the scheme was ready to be put into operation if and when required.

Finally, Mr. Russell again voiced his appreciation of the great honour of being among the select body of recipients of the Oliver Stubbs Medal, and he expressed thanks to the President and the members generally for the way in which they had received the announcment of the award.

Presentation of Meritorious Services Medal

The PRESIDENT, presenting the Meritorious Services Medal to Mr. Oldershaw (President of the West Riding Branch), who received it on behalf of Mr. S. W. Wise, said that Mr. Wise was elected an associate member in 1912, and was elected a member in 1919. He had served successively as registrar and as junior and senior vice-president of the Newcastle Branch, and was one of the first examiners for the John Surtees Memorial Examinations. He had presented several Papers to various Branches of the Institute, and was the author of a Paper published in the "Proceedings." Transferred to the West Riding Branch in 1923, he had shortly afterwards become its honorary secretary, and had held that office ever since. He had been instrumental in building up the Branch, which had had less than 50 members when he had become hon. secretary. As branch secretary he was also largely responsible for the successful organisation of the 1938 Annual Conference of the Institute, held in Bradford.

The President handed the medal to Mr. Oldershaw, and asked him to convey again to Mr. Wise the congratulations of the members and their sympathy with him in his illness.

MR. OLDERSHAW expressed profound regret that Mr. Wise could not be present to receive the medal. He had been a very good servant of the Institute for a number of years. The members of the West Riding Branch were very proud that he was their hon. secretary, and of the fact that the award of the Meritorious Services Medal had gone to him and to Yorkshire, for his work on behalf of the Branch and of the Institute generally.

Presentation of the E. J. Fox Gold Medal

MR. E. J. FOX (the donor of the gold medal which bears his name), presented to Mr. P. H. Wilson (assistant managing director (technical), Stanton Ironworks Company, Nottingham), a diploma as a token, for the time being, of the medal. It was an honour, and obviously a very great pleasure, said Mr. Fox, to be able to make the presentation to his colleague and late associate, Mr. P. H. Wilson, to whom it had been awarded by the assessors mainly for his work in the development of the centrifugal casting process for cast-iron pipes. They had worked together, he continued, for nearly a quarter of a century.

Extolling the abilities of Mr. Wilson as a technician on the subject of cast iron, he recalled the well-known definition of an engineer as a man who could do for 19s. 6d. what any jackass could do for a sovereign. Mr. Wilson had been concerned with the cast iron pipe industry, the products of which were sold at figures such as £6, £7 and £8 per ton; and a man who could make a profit out of them at such prices was by no means a jackass. Being concerned with that trade, both he and Mr. Wilson had hated steel like sin! Nevertheless, Mr. Wilson had been called upon, a year or two ago, to put down a steel foundry which had cost something like 1½ million pounds sterling, and it had been described as the best job of its kind in the country.

Formally presenting the diploma to Mr. Wilson, Mr. Fox said he was indeed proud to have been associated for so many years with a man to whom the Institute of British Foundrymen had paid so great a compliment.

History of Centrifugal Casting

MR. WILSON expressed his appreciation of the honour conferred upon him, though it was difficult, he said, to find words with which to reply adequately to the compliments paid to him by his old chief. Inasmuch as the award was made to him by reason of his work in connection with the development of centrifugal casting, he dealt briefly with the history of that development. About the year 1912 he was experimenting in this country in connection with the centrifugal casting of pipes by a process, involving the use of sand moulds, and which had been patented by Molinder—a Swede. Molinder had had great ideas and had hawked his process all over the world. Mr. Wilson recalled that he personally had been very enthusiastic, and his firm had actually installed a small experimental plant and had produced pipes. Unfortunately, however, the firm with which he was then connected had decided not to proceed with the experiments, although he had visualised the commercial prospects. It was a pity that at that stage they did not go ahead.

Later he had joined Mr. Fox at Stanton, and they had heard of the De Lavaud process of centrifugal casting. De Lavaud was a Frenchman who had lived in Brazil, and he, together with a German named Arens, had developed, or had at least ex-

Annual General Meeting of Institute

perimented with, a process for the centrifugal casting of pipes in metal moulds. They had taken out quite a number of patents. They had taken their ideas to America, but could not obtain sympathy or support from the American pipe makers. Finally, they had installed a demonstration plant in Toronto, Canada, in 1919. The Stanton Company had heard about it, and had sent a representative to Toronto to inspect it and to report. The most important phase in the development of the process, he considered, was at that time, when Mr. Fox had taken it up in spite of the fact that the Americans had turned it down. It was in a very elementary stage then, and the Stanton Company had commenced to develop it into a commercial proposition. They had had to design and re-design the machine, and an experimental plant was installed at Stanton in 1921. He would be almost afraid to give any idea of the amount of money which the Stanton Company had spent to produce the first pipe; but it was worth while. There was a time when Mr. Fox and himself had been very worried as to whether or not they had made a mistake in trying to develop the process; but, in spite of setbacks, they had persevered, for at least at that stage they had overcome the mechanical difficulties.

Then they proceeded with a large-scale plant, which had come into operation commercially in 1922. During the experimental stages they had had visits from Americans, Germans, French and Belgians, who until then had been sitting on the fence, as it were; although the Americans had been very emphatic about turning down the process in the early days, they had taken it up after seeing the results that were being obtained at Stanton. The Germans had followed that example, then the French and the Belgians. Later the process had been applied in Australia and Japan. All the plants abroad were designed on the lines developed at Stanton. Thus, one might say that Mr. Fox had fathered the process, and perhaps he himself might claim to have mothered it. The offspring had been prolific, because the output had developed, up to the beginning of the present war, to between three-quarters and one million tons of pipes per annum. That represented, not only the output of an important product, but a saving of three-quarters of a million tons of metal per annum.

Of course, there were two phases of the development—the mechanical and the metallurgical. The original pipe machine was revolved by means of a Pelton water wheel. Several improvements were introduced from time to time; 12-ft. pipes were produced originally, but finally they had produced pipes 21 ft. long. Dealing with the metallurgical developments, he said that in the early days of the development of the process the fact was advertised that an ordinary cast iron, normally having a tensile strength of 9 or 10 tons per sq. in., would produce centrifugal castings of 20, or even up to 30 tons per sq. in. High tensile strength in cast iron, however, was very often associated with brittleness; so that the high tensile cast iron, if brittle, was not suitable for a pipe. Thus, a great deal of research had had to be carried out, even involving a complete change in cupola practice and making other changes in order to produce a ductile material. Fortunately, they were able to produce that characteristic in the pipe, and at the same time maintain its high tensile strength.

In conclusion, Mr. Wilson thanked the assessors and the Institute for the great honour conferred upon him by the award of the E. J. Fox medal, which he would treasure for two reasons particularly. In the first place it recalled the work with which he had been associated in past years in connection with the development of centrifugal cast iron pipes; secondly, it bore the profile of his chief, Mr. Fox, with whom he had worked for nearly a quarter of a century.

The Edward Williams' Lecture

The morning's proceedings also included the presentation of the Fifth Edward Williams' Lecture: "Foundry Teamwork," by Dr. H. W. Gillett, Chief Technical Adviser, Battelle Memorial Institute, Columbus, Ohio, U.S.A., which was summarised by Mr. J. G. Pearce. The lecture will be reproduced in a forthcoming issue of the "Foundry Trade Journal."

Technical Sessions

In the afternoon, two technical sessions were held simultaneously, one devoted to ferrous subjects and the other to consideration and discussion of the reports on low-tin and tin-free bronzes and brasses submitted by members of the Non-Ferrous Sub-Committee of the Technical Committee. The first parts of these reports have appeared in the Journal; the last part will be found elsewhere in this issue (see pp. 247 to 251).

The ferrous Papers presented were the following: "The Production of Uniform Steel for a Light Castings Foundry," by C. H. Kain and L. W. Sanders; "ArmaSteel or Pearlitic Malleable Cast Iron," by Carl F. Joseph; and "The Substituting of High-Duty Grey Iron for Steel Castings," by J. Blakiston. These Papers and the discussions following on their presentation will be included in subsequent issues of the "Foundry Trade Journal."

STANTON *Dale* REFINED PIG IRON

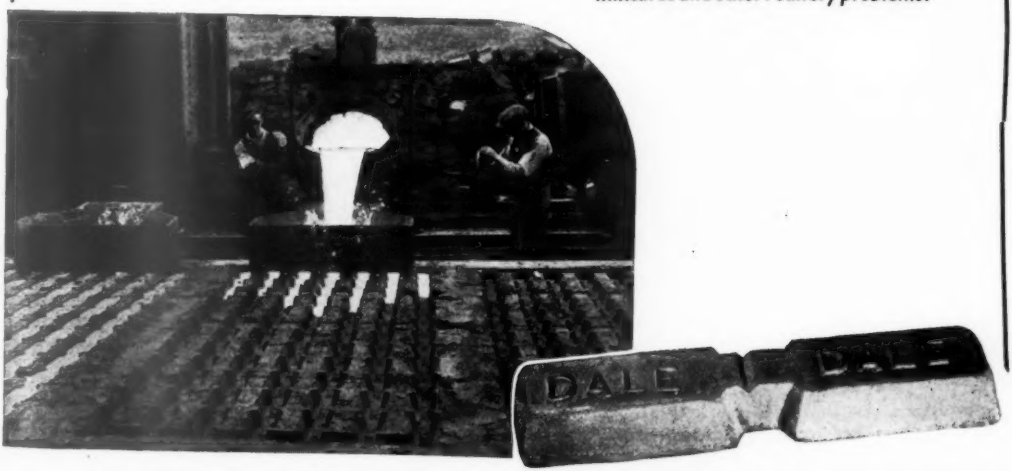
IS CHARACTERISED by closeness of grain structure, uniformity of composition and fine graphitic carbon evenly distributed.

IS PRODUCED to guaranteed analysis in seven standard grades.

CAN BE MADE to customers' individual requirements with total carbon from 2·6 per cent. upwards.

SHOULD BE USED to tone up high phosphorus irons and scrap, to replace Hematite, and to produce castings for all high duty purposes.

Users are invited to avail themselves of the Stanton Technical Service which offers free expert advice on special mixtures and other Foundry problems.



THE STANTON IRONWORKS COMPANY LIMITED, NEAR NOTTINGHAM

REGIONAL PRODUCTION CONTROLLERS

Mr. Lyttelton, Minister of Production, has appointed the following Regional Controllers:—

London and South-East.—Mr. C. B. Colston, chairman, Hoover, Limited.

Southern.—Mr. John W. Howlett, chairman, Wellworthy Piston Rings, Limited.

South-West.—Mr. H. I. C. Rogers, joint managing director, Brecknell Munro & Rogers (1928), Limited.

Wales.—Mr. Percy Thomas, formerly Welsh Regional Controller, Ministry of Supply.

Midland.—Col. H. B. Sankey, managing director, Joseph Sankey & Sons, Limited.

North-West.—Mr. Loris E. Mather, chairman, Mather & Platt, Limited.

Scotland.—Mr. Lewis J. B. Forbes, managing director, Triplex (Northern), Limited.

Northern.—Lord Ridley, a director of the Consett Iron Company, Limited, and the L.N.E.R.

East and West Riding.—Mr. Charles H. Crabtree, chairman, R. W. Crabtree & Sons, Limited.

North Midland.—Mr. Harold H. Berresford, managing director, Staveley Coal & Iron Company, Limited.

Eastern.—Mr. H. Weston Howard, managing director, Heyward Tyler & Company, Limited.

The Regional Controllers will be the chairmen of the Regional Production Boards, the other members of which are the regional representatives of the Admiralty, the Ministry of Supply, the Ministry of Aircraft Production, the regional controller of the Ministry of Labour and National Service, the regional representative of the Board of Trade, and three representatives of the employers and three of the workers in the region.

PERSONAL

MR. FREDERICK SCOPES has been appointed managing director of the Stanton Ironworks Company, Limited, in succession to Mr. E. J. Fox, who resigned as from June 30 after 25 years in that post.

MR. ALEXANDER DUNBAR has been appointed Controller-General at the Ministry of Aircraft Production in succession to Sir Charles Craven, who, as already announced, has had to resign that appointment on medical advice. Mr. Dunbar has been director in charge of Vickers-Armstrongs' aviation interests since 1938. He is 53 years of age.

MR. WALTER PARKER, who has been technical demonstrator for many years of Kingscliffe Super Refractories, Limited, Sheffield, has now been appointed to the board of directors of the company. Appointments to the boards of other companies associated with Hinckleys, Limited, are also announced. Mr. Percy Stapleton, secretary/accountant, and Mr. F. M. Ranson have been elected directors of Hinckleys Silica Sands, Limited, while Mr. Allan Evans has been appointed to the board of directors of Durhills, Limited, producers of moulding sands, in recognition of twenty years' service.

CONFERENCE ON MINERAL RESOURCES

Arranged by the British Association, a conference on mineral resources and the Atlantic Charter, will take place on July 24 and 25 at the London School of Hygiene and Tropical Medicine. The conference will be opened by Sir Richard Gregory, F.R.S., President of the Association, and the chair at the successive sessions will be taken by Sir Thomas Holland, F.R.S., Sir William J. Larke, Dr. C. H. Desch, F.R.S., and Sir Stafford Cripps. Among expected speakers are Prof. H. H. Read, F.R.S., Prof. C. B. Fawcett, Prof. W. R. Jones, Sir Lewis Fermor, F.R.S., Dr. E. F. Armstrong, F.R.S., Dr. W. H. Hatfield, F.R.S., Dr. L. Dudley Stamp, and Prof. J. G. Smith. As the world's natural resources—both organic and inorganic—are much too large a subject to be dealt with in a single conference, coal and oil will not be discussed, except incidentally. A survey of the present position in relation to minerals of industrial importance, however, with suggestions for further investigations into their geographical distributions, and research into the production of substitutes, should, the Association states, reveal the close contact between science and fundamental national and international problems. By presenting the chief facts of natural resources of minerals and their geographical control, the conference will aim at helping to promote recognition of the interdependence of nations and the need for collaboration between them.

MUST SEGREGATE HIGH-SPEED STEEL SCRAP

The Ministry of Supply have issued the Control of Iron and Steel (No. 24) (Scrap) Order, 1942, which came into force on July 4. It provides that every person having in his possession in any premises scrap steel containing tungsten shall segregate such scrap from all other scrap and keep it so segregated in one place in those premises. The Order does not affect the right of an owner of scrap steel containing tungsten from disposing of it in the ordinary course of business to a merchant licensed to buy such class of scrap.

In addition, the Order further varies the Control of Iron and Steel (No. 14) (Scrap) Order, 1940, by fixing the maximum price for high-speed steel solid scrap containing 5 to 6½ per cent. tungsten and 5 to 6½ per cent. molybdenum at 9d. per lb. and for high-speed steel turnings of a similar specification at 5d. per lb.

Core and Moulding Sands.—The Core and Moulding Sands Committee co-operating with the Verein deutscher Giessereifachleute is preparing, with the aid of questionnaires circulated to the foundry industry, a report of the various core and moulding sands in use in German foundries and a survey of standards of quality, etc., required of these sands.

SEVEN PILLARS OF PROGRESS

1. Liberty to learn, opportunity to teach and power to understand, are necessary to the extension of knowledge

"The Charter of Science" British Association 1941

Medieval trade guilds guarded the secrets and mysteries of their craft so carefully that the result was stagnation in technical progress lasting for centuries.

The power of the guilds waned with the advent of organised teaching and the ready admittance to learning of all those with ability to understand.

Out of this was born the scientific method which, by contrast, derives strength through the publication, dissemination and the mutual exchange of knowledge between scientists recognising no bounds of space or nationality.

Modern industrial organisations maintain skilled staffs and much specialised apparatus for the investigation of scientific properties pertaining to their manufacture and methods of production. Discoveries in pure and applied science are not held secret but are available to any branch of industry for the solution of their individual problems.

Scientific and technical journals carry the findings to men of all nations.

THE UNITED STEEL COMPANIES LTD

THE UNITED STEEL COMPANIES LIMITED

Steel, Peech & Tozer, Sheffield | Samuel Fox & Co. Ltd., Sheffield | United Strip & Bar Mills, Sheffield | Appleby-Frodingham Steel Co. Ltd., Scunthorpe | Workington Iron & Steel Co., Workington | The Sheffield Coal Co. Ltd. | The Rothervale Collieries, Treeton | United Coke & Chemicals Co. Ltd. | Thos. Butlin & Co., Wellingborough

U.S.P.1.

COMPANY NEWS

(Figures for previous year in brackets.)

Hick Hargreaves—Final dividend of 8%, making 10% (7%).

Briton Ferry Steel—Final dividend of 7½%, making 10% (same).

Harland & Wolff—Dividend of 6% on the "A" and "B" ordinary shares (same).

Bradley & Foster—Final dividend of 6%, plus a 2½% bonus, making 12½% (same).

Swan, Hunter & Wigham Richardson—Interim dividend of 4% on the ordinary shares (same).

Anderston Foundry Company—Profit to March 31, £16,643 (£12,630); dividend of 3s. 9d. per share (3s.).

Bromilow & Edwards—Net profit, £19,119 (£5,841); dividend of 10% and a bonus of 2½%, making 12½% (5%).

W. & T. Avery—Net profit for the year to March 31, £130,407 (£130,661); final ordinary dividend of 10% (making 15%).

Newman & Watson—Net profit to March 31, £13,594 (£5,037); preference dividend, £1,800 (same); forward, £4,279 (£785).

Associated British Engineering—Net revenue to March 31, £20,118 (£11,992); dividend of 5% on the ordinary shares; forward, £5,529 (£4,667).

Lilleshall Company—Profit for 1941, after providing for depreciation, taxation, etc., £17,264 (£20,334); preference dividend, £10,500; dividend of 10% on the ordinary shares and a further 1% on the preference shares; forward, £73,863 (£71,299).

Rotherham Forge & Rolling Mills—Trading profit for the year ended March 31, £42,518 (£39,171); balance, after providing for taxation and depreciation, £11,563 (£14,373); to reserve, £5,000; final dividend of 10%, less tax, on the ordinary shares, making 15% (same); forward, after preference dividend, £9,231 (£10,845).

J. Stone & Company—Trading profit for 1941, £474,151, after providing for taxation; depreciation, £236,818 (£173,798); buildings replacement and repairs, £16,688 (£7,247); depreciation of freehold buildings, £2,536 (£2,487); net profit, £214,109 (£208,521); dividend on the ordinary shares of 25% (same); preference dividend, £39,000; forward, £276,415 (£251,406).

Allied Ironfounders—Dividends declared by the subsidiary companies for the year to March 31, after deduction of tax, £311,767 (£104,542); interest on deposits and investment income, £12,506; directors' commission, £7,909; to income-tax reserve, £110,000; to contingencies reserve, £30,000; to general reserve, £30,000; dividend on the 7% cumulative preference shares, £35,962; dividend on the ordinary shares of 10% (6%) and a bonus of 2½% (nil); forward, £183,706 (£179,617).

PRODUCTION OF MALLEABLE iron castings in the United States during 1941 totalled 843,038 tons, the highest yearly output on record, comparing with the previous high of 824,856 tons in 1929, according to the Department of Commerce. In 1940 total output aggregated 565,923 tons.

NEWS IN BRIEF

CLEVELAND MINERS' AND QUARRYMEN'S ASSOCIATION has decided to submit a claim for wages increases on the same lines as those conceded to coal miners.

THE FEDERATION OF BRITISH INDUSTRIES has set up a committee, with Sir Charles Bruce-Gardner as chairman, to study and report on the part to be played by trade associations in the future organisation of industry.

W. C. HOLMES & COMPANY, LIMITED, engineers, of Huddersfield, have opened an office at 21, Bennett's Hill, Birmingham, 2 (telephone: Midland 6830), which will be in charge of Mr. M. D. Auchterlonie, who was previously chief assistant to Mr. Watson at their London office.

A COMMITTEE OF INVESTIGATION has been appointed by the Minister of Labour to inquire into the causes and circumstances of the recent stoppages of work in the hematite mining industry of West Cumberland, and to make recommendations regarding the system of wages payments and conditions of employment.

AT THE SIXTH annual meeting of the Scottish Agricultural Machinery Association, held in Edinburgh, the President, Mr. Thomas Hutchison, of Aberdeen, stated that every effort had been made to provide farmers with the implements necessary for the increased acreage. Mr. Hutchison was re-elected President.

AN APPRENTICE MOULDER who was sent to prison for 60 days at Glasgow Sheriff Court when he admitted charges of absenteeism, pleaded guilty to having been late for duty on 31 occasions between March 12 and May 12, 1942, and to having been absent on four days. Accused had previously appeared before the Court in February, 1942, and had been sent to prison for 21 days. Despite that sentence, his attendance at work had not improved, the prosecution stated.

OBITUARY

MR. ARTHUR HUGH WOLSELEY, managing director of Charles Clifford & Son, Limited, metal rollers, of Birmingham, died on June 28.

MR. P. M'FARLANE, who was for many years associated with Shaw (Glasgow), Limited, ironfounders, of Maryhill Ironworks, died recently.

MR. THOMAS S. WILSON, for many years with Stewarts and Lloyds, Limited, at their Tollcross works, died at his home at Tollcross, Glasgow, on June 26.

MR. THOMAS ROBINSON, who has died at Darlington at the age of 72, was formerly assistant works manager at the L.N.E.R., North Road Works, Darlington. He retired ten years ago, after 47 years with the railway company.

MR. HERBERT J. WILLIAMS, of Swansea, died suddenly recently while at work in the laboratory at the Grovesend Steelworks, Gorseinon, where for some years he had been metallurgical chemist. He was a past-president of the Swansea Metallurgical Society and for many years lectured at Swansea Technical College.

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Raw Material Markets

IRON AND STEEL

There has been no official pronouncement as yet as to what effect the increased fuel costs will have on selling prices of iron and steel. It is reasonable to assume that producers will press for some consideration, as they have been called upon to shoulder higher costs in many directions since the fixed price schedules were revised, but the Government, it is understood, is anxious that current selling quotations be maintained. The fuel bill in the iron and steel industry represents a major item in costs of production, and the latest increase of 3s. per ton in pithead prices will reduce still further the slender margin of profit which is now available to iron and steel makers. It was announced in Parliament on Tuesday that the Government is to discuss the position with the industry.

The supply of high-phosphorus iron continues to be ample to meet all requirements. Demand from the light-castings industry has fallen away considerably, owing to the many restrictions which have been applied to this section since the outbreak of the war, and there is little indication that light foundries will experience happier conditions until after the restoration of normal trading facilities. Support from the Government has been very slight and, in fact, various decrees made by the Government have reacted most unfavourably on the industry.

Nevertheless, demand for high-phosphorus iron has expanded, as it is proving a satisfactory substitute for other qualities of iron which cannot be obtained so easily. However, makers are in a position to supply all requirements promptly and the Control authorities have granted permission for some buyers to purchase in excess of their immediate needs. Supplies of low-phosphorus and hematite irons are not sufficient to meet the requirements of the heavy engineers and speciality foundries, who are consequently incorporating high-phosphorus and refined irons, together with a proportion of steel scrap, in their mixtures. Refined iron has, until recently, been in good supply, but latterly there has been some tightening up in this quality.

In view of the recent increase in the price of coal, it was expected that some change would be made in the coke quotation. Foundry coke has now been advanced by 6s. 6d., making the "at ovens" quotation for best Durham makes 53s. 3d. per ton. Furnace coke prices were still under discussion when this issue went to press, but a substantial increase is inevitable.

Generally speaking, conditions in the steel industry are satisfactory, but there is need for larger outputs of special qualities. Production of these important grades has been stepped up appreciably in recent months, but consumption still tends to outstrip the supply and is continuing to expand. Production of aircraft, munitions, armaments, etc., depends to a large extent on the delivery of special steel. Plates and thick sheets are needed in increasing tonnages for the shipyards and heavy trades generally, while special qualities of sheets are in insistent request. Common black sheets are not particularly active, while galvanised sheets may now be produced only under official direction.

Supplies of scrap suitable for the foundries have been forthcoming quite well of late, but certain grades used by the steelworks are still rather difficult. In the past some inconvenience has been caused by the congestion of scrap traffic, and it is interesting to learn that the steelworks in the West Wales area have brought into operation a system whereby permits are issued for the regulation of deliveries.

NON-FERROUS METALS

Under a new agreement between the American Metals Reserve Company and Bolivian tin producers the amount of Bolivian tin ores and concentrates which may be delivered to the company during the period ending June 30, 1943, is increased, while the price for tin content material delivered during the period is increased to 60 cents per lb., f.o.b. Chilean and Peruvian ports.

Statements of the free assets and current liabilities of a group of seven Malayan tin-mining companies were issued last week. The properties of the companies are now in enemy occupied territory. The companies concerned are Gopeng Consolidated, Kent (F.M.S.) Tin Dredging, Pengkalen, Rambutan, Seremban, Tekka, and Tekka-Taiping. An identical statement with regard to each of the seven companies points out that before the companies' properties were evacuated the use of all mining plant and machinery was effectively denied to the enemy. The extent of the loss thus sustained is at present not known; the question of compensation for war damage has been taken up with the British Government, and it is hoped that the matter will receive favourable consideration and that the companies will be compensated for any loss sustained.

Supplies of both copper and spelter continue to reach war production factories and adequate tonnages are being released for all purposes which the Control consider are vital to the war effort. Distribution among other classes of users has been cut to the bone and extravagant usage of these metals has been eliminated.

Good supplies of lead are on hand in this country. The stricter regulations governing distribution are not in any way due to shortage of lead, of which good stocks are held, but the authorities are anxious to conserve existing supplies for contracts associated with the war effort. In the United States, lead is being used as a substitute for other metals, with the result that consumption has appreciated to a considerable extent of late. Strict economy is being exercised where possible, as developments in Burma are unfavourable to the lead supply, while the threat to Australia is also an important factor to be considered.

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